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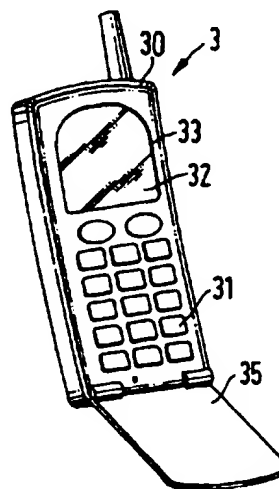
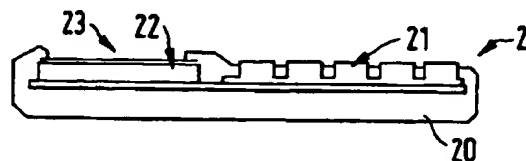
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None

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ONLINE: WPI, JAPIO, CLAIMS

(54) Abstract Title  
**Mobile telephone with transparent loudspeaker panel**

(57) A mobile telephone 2 comprises a microphone (figure 3, 25), a display panel 22 and a loudspeaker panel 23. The loudspeaker panel 23 is transparent and is located over the display panel 22. The mobile telephone 2 may or may not have a moveably hinged section 35. The mobile telephone can either have a keyboard 31 or alternatively the loudspeaker panel (figure 8, 53) , located over the display panel (figure 8, 52) can additionally carry a transparent touch sensitive panel.



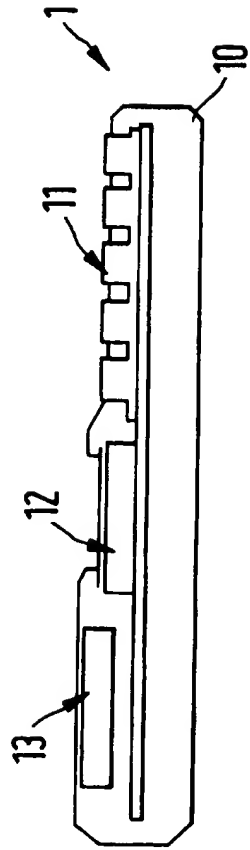


FIG. 1

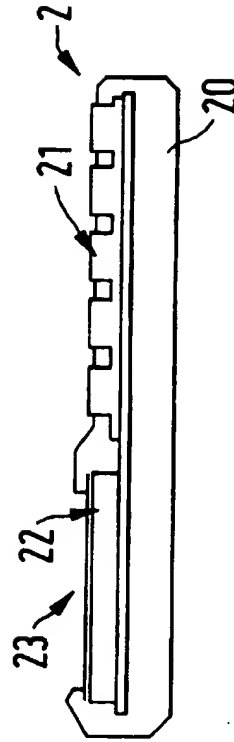


FIG. 2

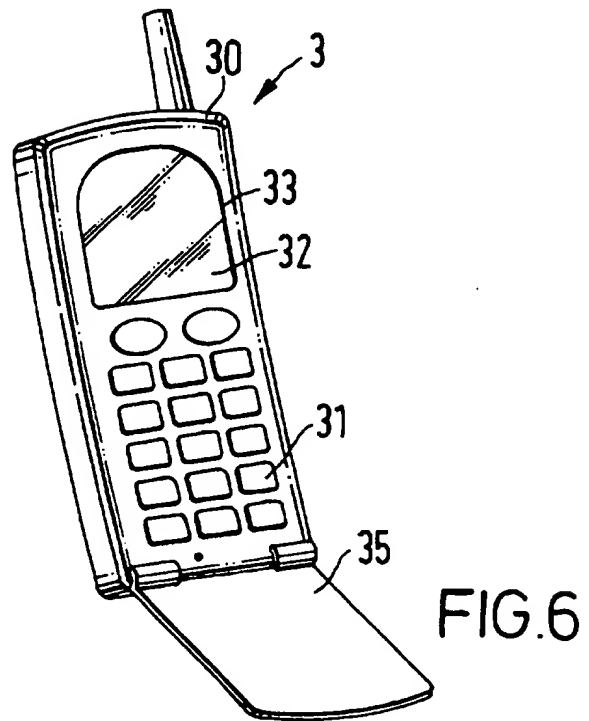
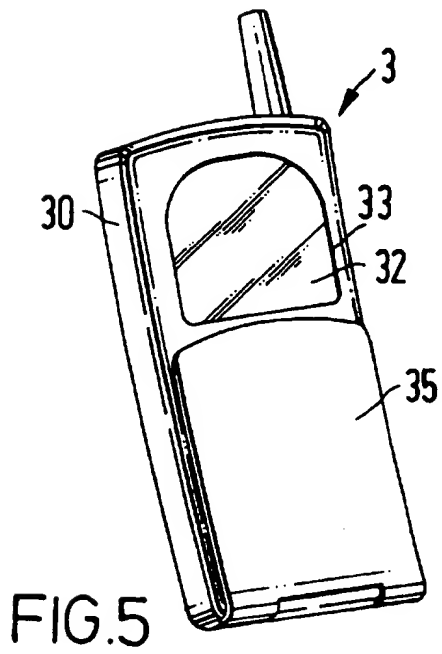
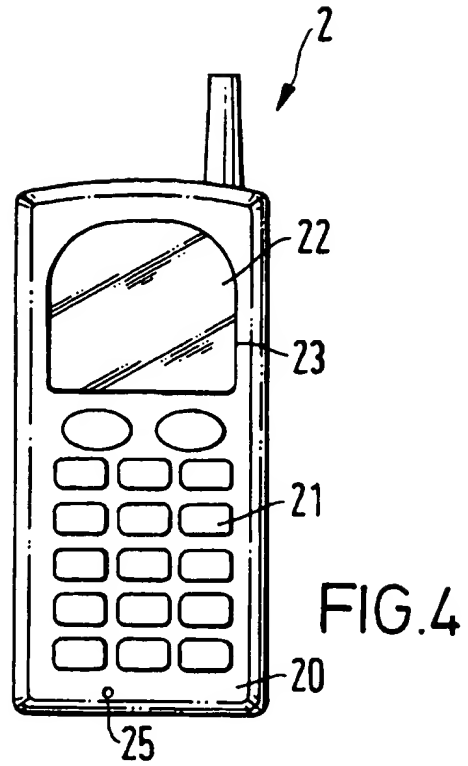
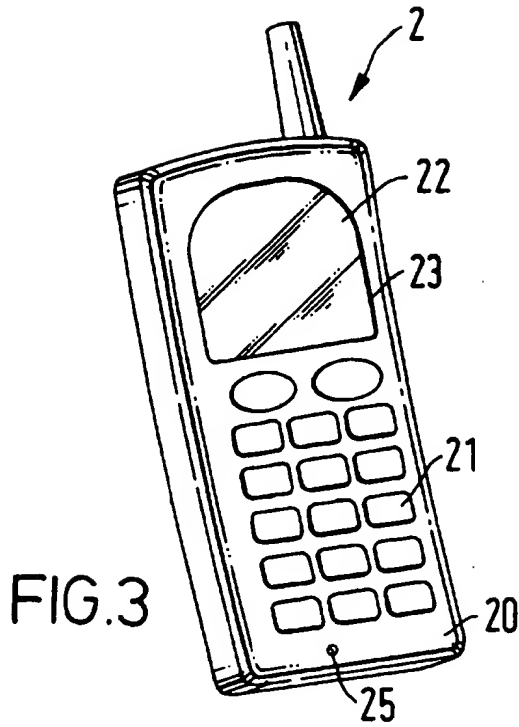


FIG.7

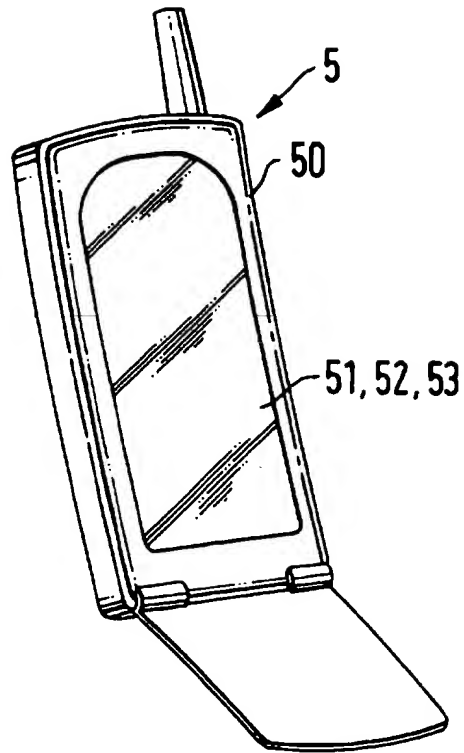
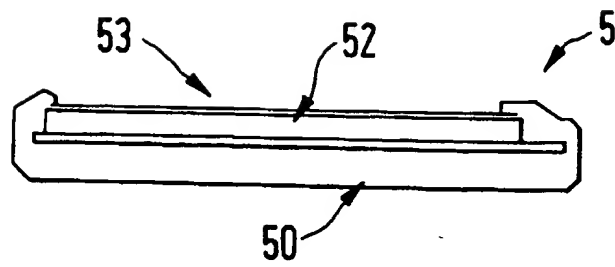


FIG.8



MOBILE TELEPHONES

The present invention relates to mobile telephones, and in particular to loudspeakers used in mobile telephones.

5 DESCRIPTION OF THE RELATED ART

Mobile telephones which are currently on the market, generally include a telephone housing which carries a keypad, a display, and a loudspeaker. In addition, a microphone is provided, and usually an  
10 antenna is attached to the telephone housing.

The loudspeaker, display and keypad are arranged separately from one another on the telephone body, and so such an arrangement places limits on the minimum size of the telephone and/or the maximum size of each  
15 component.

SUMMARY OF THE INVENTION

It is therefore an object of one aspect of the present invention to provide a mobile telephone having a keypad, display and loudspeaker which have improved  
20 ergonomics and usability for a given size of mobile telephone body.

According to one aspect of the present invention, there is provided a mobile telephone comprising a display panel and a loudspeaker panel, the loudspeaker  
25 panel being transparent and located over the display panel.

Such a construction allows a mobile telephone to have only one surface area used for both the display and the loudspeaker.

30 BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a sectional side view of a previously considered mobile phone;

Figure 2 shows a side sectional view of a first embodiment of the present invention;

35 Figures 3 and 4 show perspective and front views of the mobile telephone of Figure 2;

Figures 5 and 6 show perspective views of a modification of the mobile telephone of Figures 2, 3 and 4; and

Figures 7 and 8 show a perspective view and a side sectional view of a second embodiment of the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

Figure 1 shows a conventional mobile telephone, which comprises a handset body 10, which carries a keyboard 11, a display 12, and an earpiece or loudspeaker 13. As will be readily appreciated from Figure 1, since the keyboard 11, display 12 and earpiece 13 are provided by separate individual components, the minimum overall size of the handset is determined by the cumulative size of these components. Alternatively, the maximum size of the components is determined by the size of the handset/body. Thus, for a given size of handset, with a usable keyboard 11, the display and ear piece 12 and 13 compete with one another for space in the handset body.

An embodiment of the present invention is shown in Figures 2, 3 and 4, and comprises a handset body 20, a keyboard 21, a display 22, and a loudspeaker panel 23. In the mobile telephone 2 of Figure 2, the loudspeaker panel is located directly over the display panel 22. The loudspeaker panel is made of a transparent material, such that the display can be seen through the loudspeaker.

The loudspeaker panel 23 can be produced by providing an acoustic panel in accordance with the method shown in International Patent Application No. WO97/09842 (Verity Group plc). The patent application describes a method of producing an acoustic device from a substantially planar member.

In an embodiment of the present invention, the transducers used for producing the acoustic panel would

be arranged so that the field of view is not obscured.

As can be seen in Figures 3 and 4, a microphone 25 is provided for picking up a user's voice.

5 The location of the display 22 and loudspeaker panel 23 enables larger components for each function to be used. In an embodiment of the invention the space usually need for a loudspeaker can be used to enlarge the size of display and/or keyboard area. This results in generally improving the ergonomics and usability of  
10 particularly small mobile phones.

In small mobile phones, the loudspeaker to microphone distance can prove to be too small, and so this problem can be overcome by use of a flip or extending microphone 35 as shown in Figures 5 and 6.  
15 In Figures 5 and 6, a display 32 and loudspeaker panel 33 are one again coincident on the handset body.

Another embodiment of the present invention is shown in Figures 7 and 8 and comprises a handset body, a display panel 52, and a loudspeaker panel 53. The  
20 loudspeaker panel is again located over the display panel and is transparent to allow the display panel to be seen from the front of the phone. The flat loudspeaker surface can carry a touch sensitive panel, which is also transparent, to detect key presses on the  
25 surface of the panel. This could be provided by, for example, using conventional touch screen technology.

Alternatively, the acoustic properties of the panel can be used to provide a touch-sensitive panel, by incorporating a secondary transducer which operates  
30 in combination with the primary transducers. Such a combination can be used to determine the position of the panel of a finger or selection device such as a pen.

The advantage of the telephone shown in Figures 7  
35 and 8, is that the large size of loudspeaker can permit hands-free performance from a small sized unit. In

addition, the functionality and ergonomics of the telephone can be greatly improved, since the display/keyboard is readily controlled by the telephone software.

5

It will thus be appreciated that embodiments of the present invention, which provide a transparent loudspeaker panel over a display panel, can improve on current mobile telephone technology.



CLAIMS

1. A mobile telephone comprising a display panel, and a loudspeaker panel, the loudspeaker panel being transparent and located over the display panel.

5        2. A mobile telephone as claimed in claim 1, further comprising a keypad.

3. A mobile telephone as claimed in claim 1 or 2, wherein the loudspeaker panel or the display panel provides a touch sensitive keypad.

10       4. A mobile telephone as claimed in claim 1, 2 or 3, wherein the loudspeaker panel also provides a microphone for the telephone.

5. A mobile telephone as claimed in claim 1, 2, 3 or 4, wherein the display panel is a liquid crystal display panel.

15       6. A mobile telephone substantially as hereinbefore described with reference to, and as shown in, Figures 2 to 8 of the accompanying drawings.



Application No: GB 9723064.3  
Claims searched: 1 to 6

Examiner: Ruth Patterson  
Date of search: 3 February 1998

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): H4J (JK, JED); H4L (LECX).

Int Cl (Ed.6): H04B 1/08, 1/38; H04M 1/02, 1/03, 1/60, 1/62.

Other: Online: WPI, JAPIO, CLAIMS.

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
	NONE	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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